Thermal Leak correction preliminary evaluation

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Evaluation of the thermal leak correction was conducted on one granule produced by MCST, one version with the thermal leak correction activated, one with the correction off provided previously. The granule corresponds to data acquired on day 2001 192 at 1345. Figure 1 is a RGB of the associated surface reflectance product.

The analysis of the data in band 5,6,7 at 500m, over water is presented on Figure 2a-d. We tried to select a uniform area of low reflectance. Band 1 and 2 are also plotted on Figure 2 and shows basically that the transect is free of cloud, sunglint or any contamination that could affect band 5,6,7. The thermal leak correction appears to correct some of the problem observed in the non-corrected data (saturated negative values, in band 7), large difference between subframes (reduced by a factor 2-3 after correction).

The analysis of data provided in figure 3a-d, is more informative. Band 1 and 2 are again provided to check the uniformity of the area. The data after correction appears better than before correction especially in band 7 (figure 3c) where the correction decreases the difference between subframes to almost none. We also include for band 5 (figure 3d), the selection of this particular detector which shows large subframe differences before and after, this detector, we believe, is already identified by MCST as “out of family”.

The last series of figure are illustrating results over clouds. Some noticeable subframe differences are present in band 5 before correction. After correction, the difference is greatly reduced, this reduction is probably due to the difference in m1 which are different in the uncorrected data and corrected data.

Conclusion

The preliminary analysis shows that the thermal leak correction improves the quality of the data in band 5,6,7. The residual difference observed over water deserves more attention given the very good results obtained over vegetation (band 7).

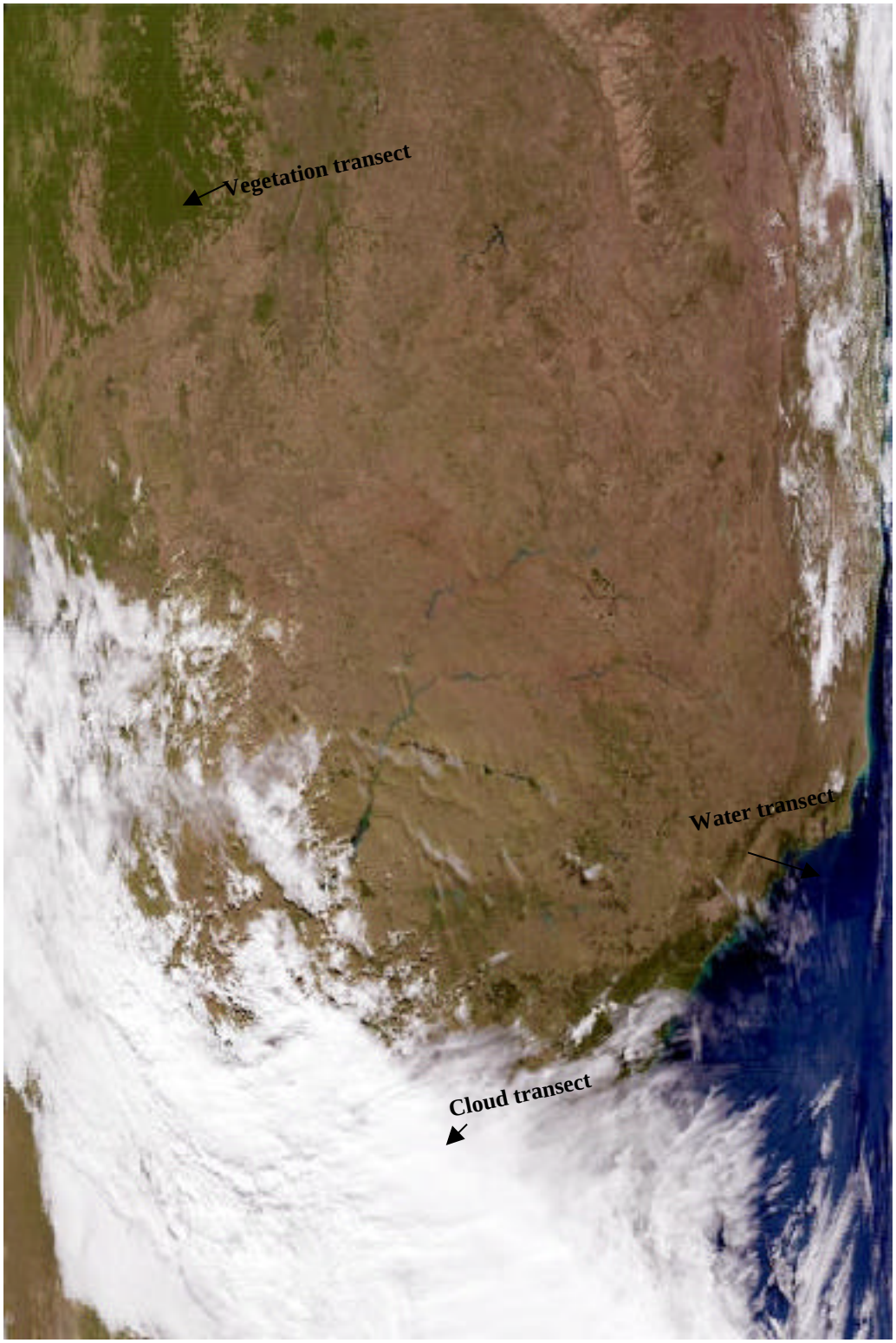

Figure 1: RGB of the selected granule (MOD09 product). The three areas used for Figure 2 (water), Figure 3 (vegetation) and figure 4 (clouds)are indicated by boxes.

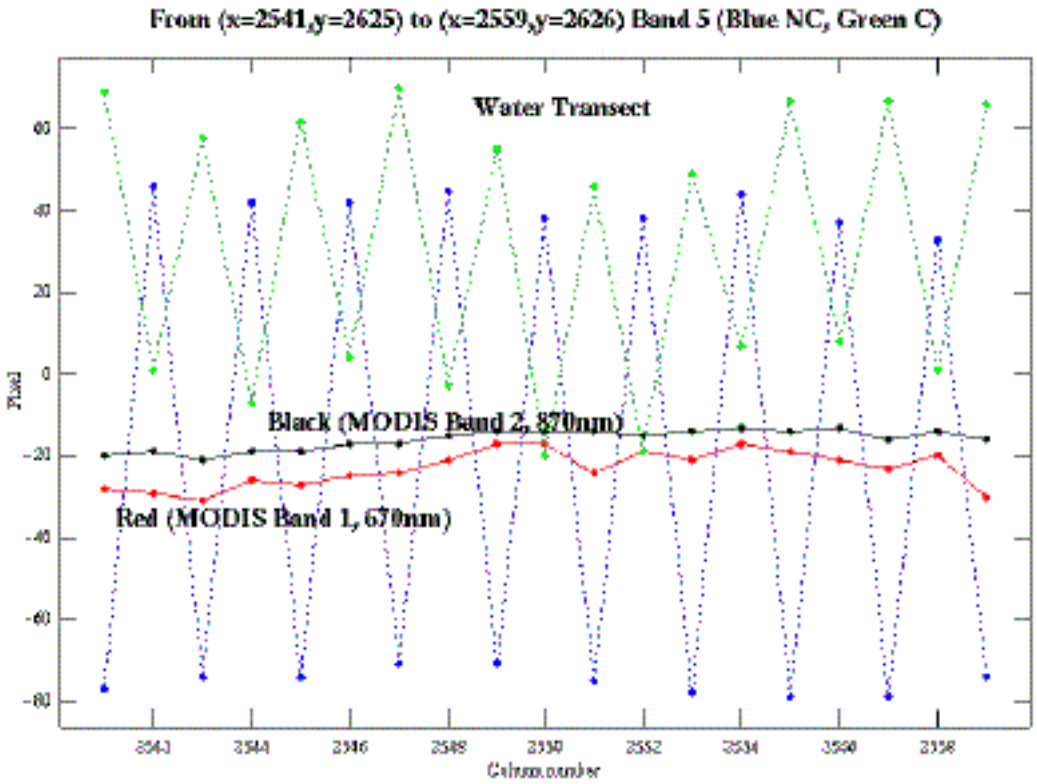

Figure 2a: Transect over water , comparing the reflectance observed in MOD09 band 5 before (green) and after (blue) thermal leak correction. The reflectance in band 1 and 2 give an idea of the variability of the signal (it is sighlty negative after atmospheric correction).

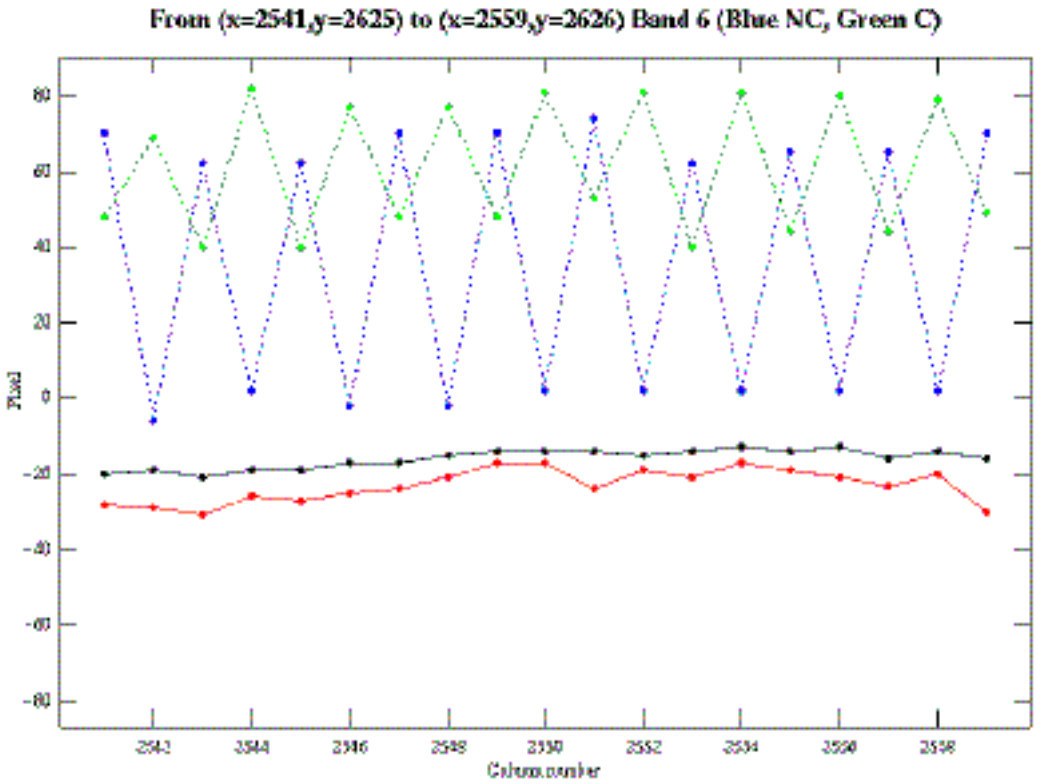

Figure 2b: Same as figure 2a but for band 6.

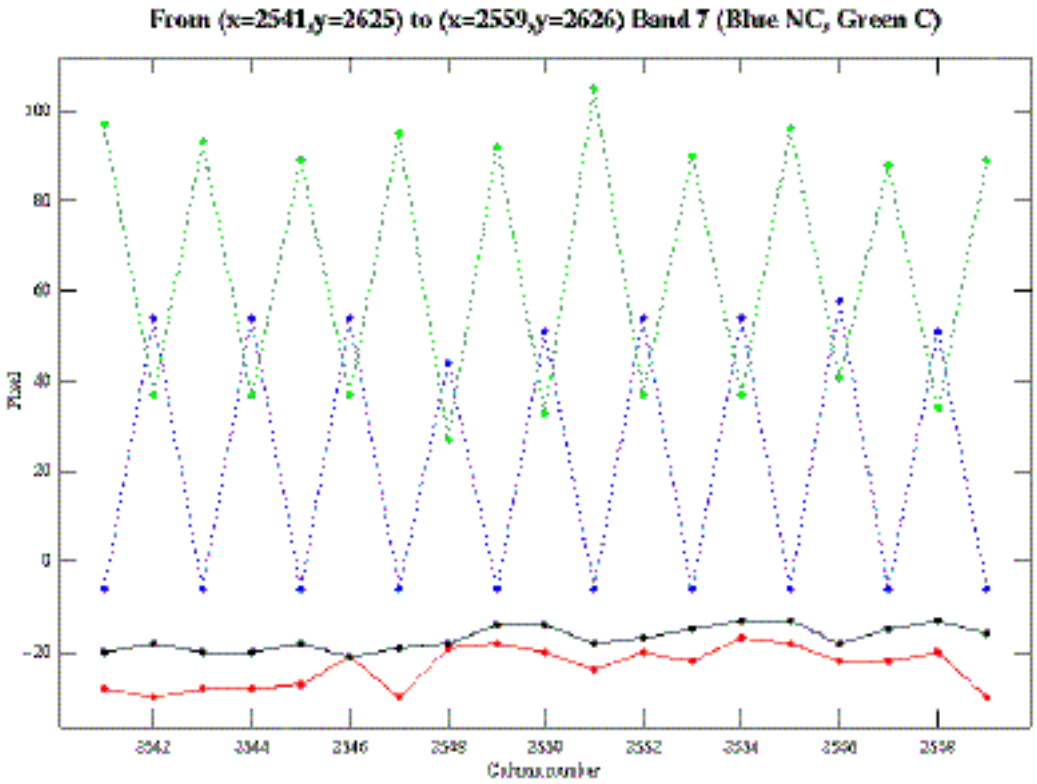

Figure 2c: Same as figure 2a but for band 7.

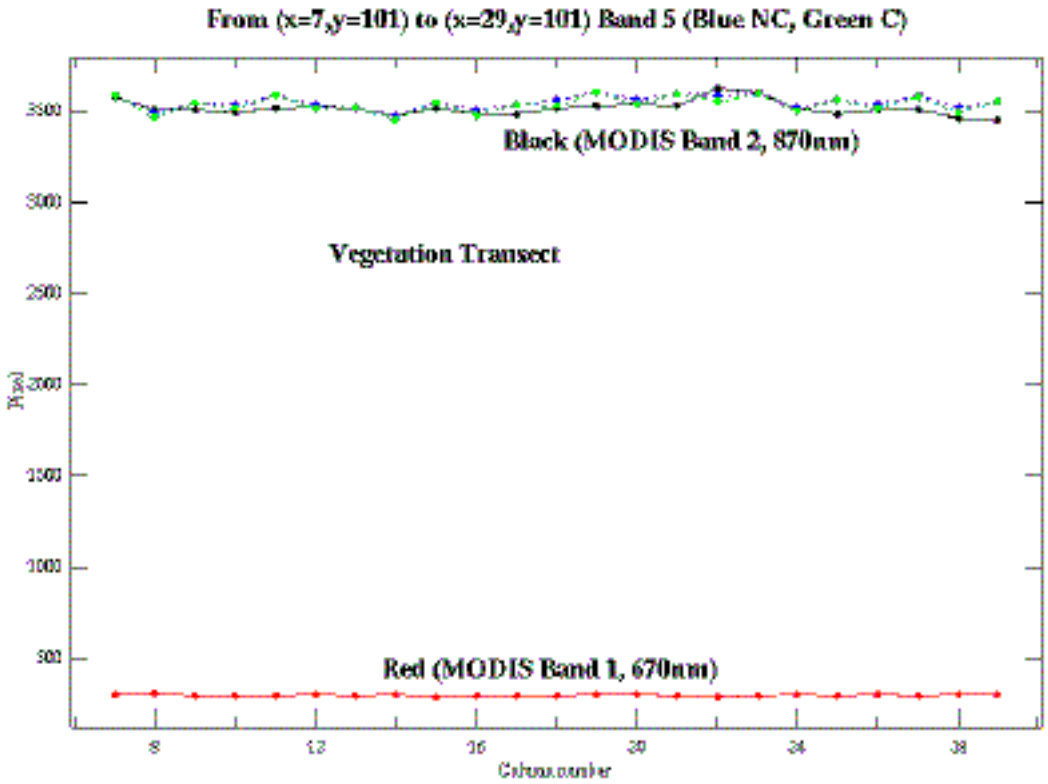

Figure 3a: Same as figure 2a but over vegetation.

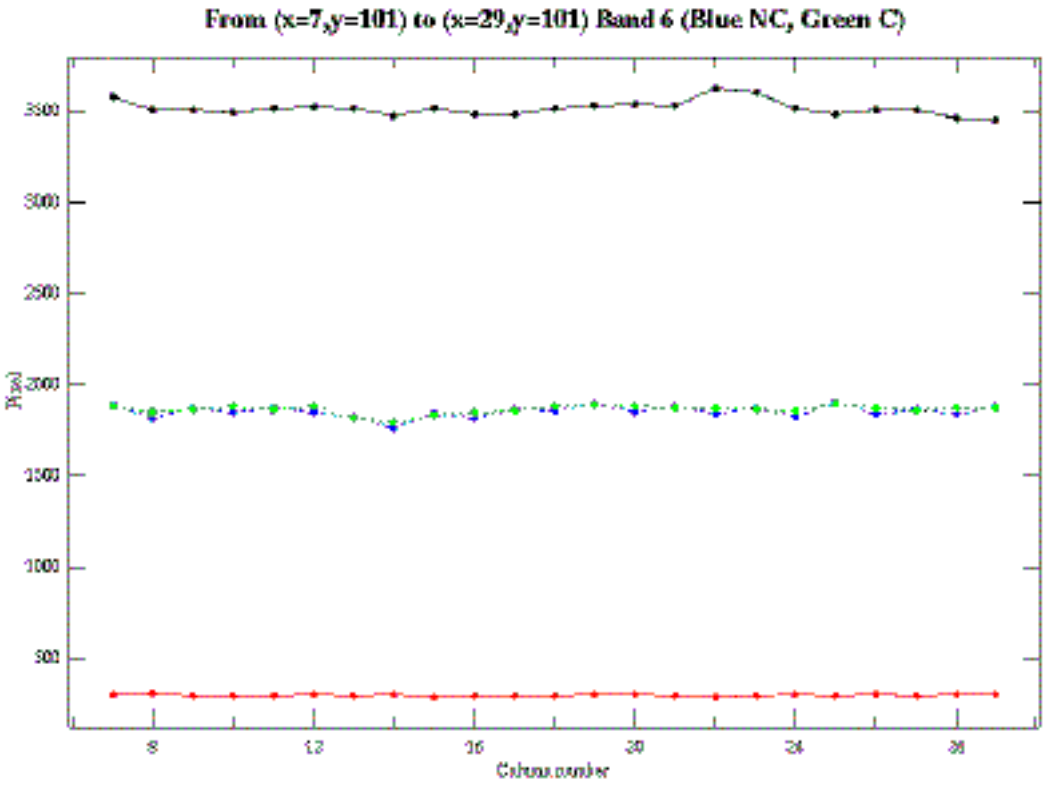

Figure 3b: Same as figure 3a but for band 6.

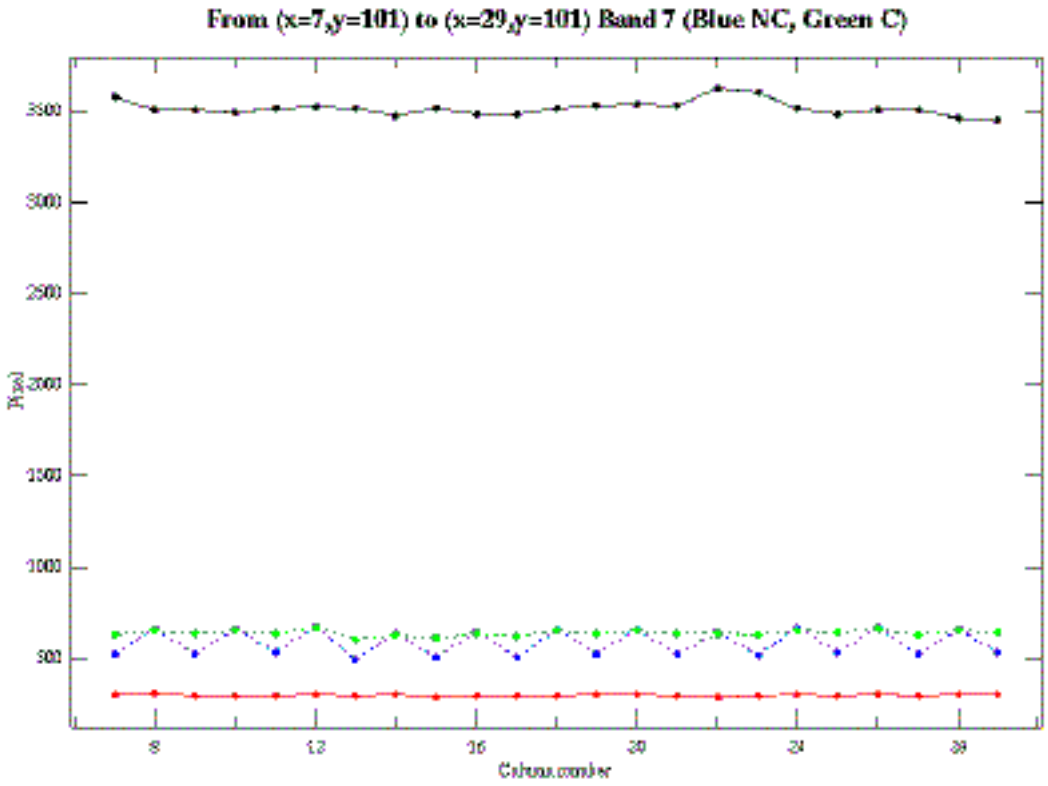

Figure 3c: Same as figure 3a but for band 7.

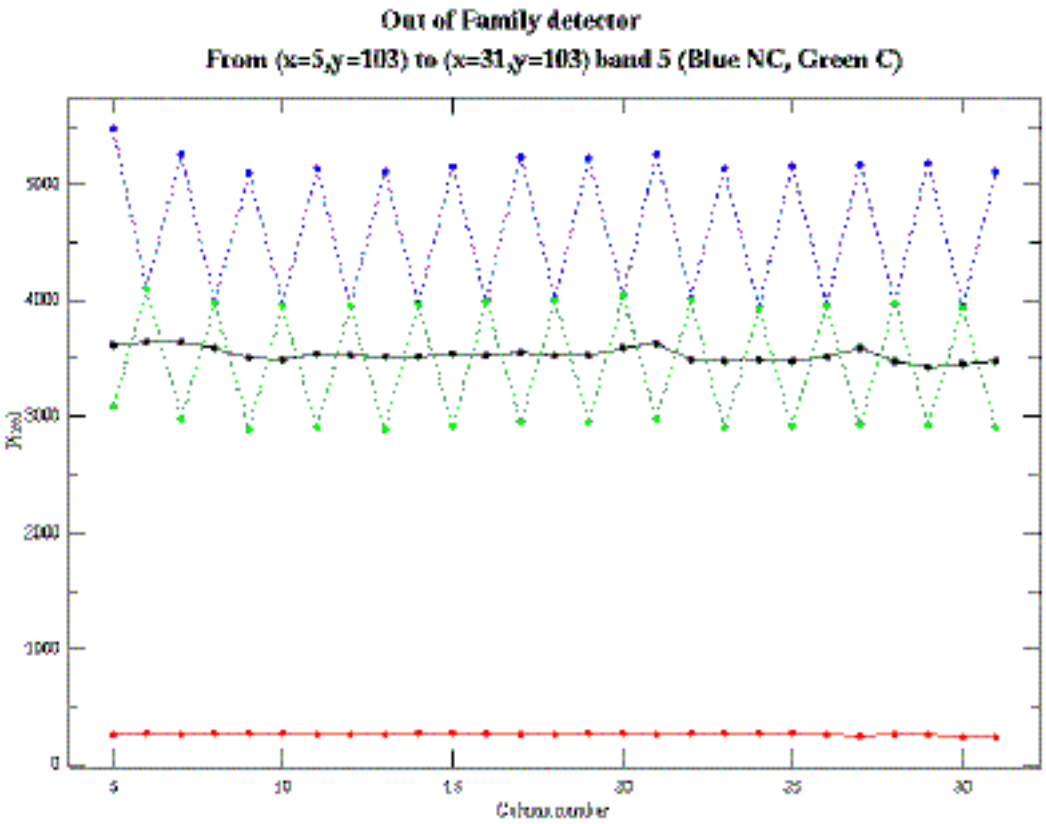

Figure 3d: Same as figure 3a but for an other detector in band 5 (probably “out of family”).

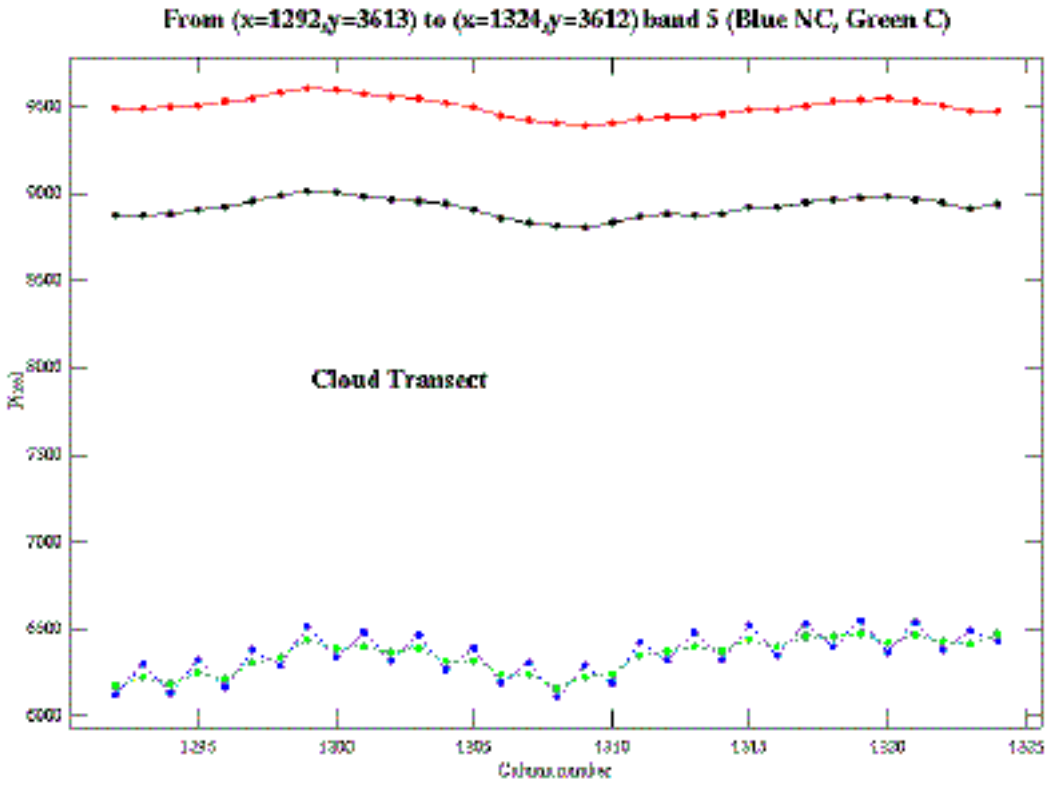

Figure 4a: Same as figure 3a but for a cloud, notice how the subframe difference is reduced after thermal leak correction. At this high signal level, the reduction in subframe difference is coming from the revised m1 which are subframe dependent rather than the thermal leak correction itself.

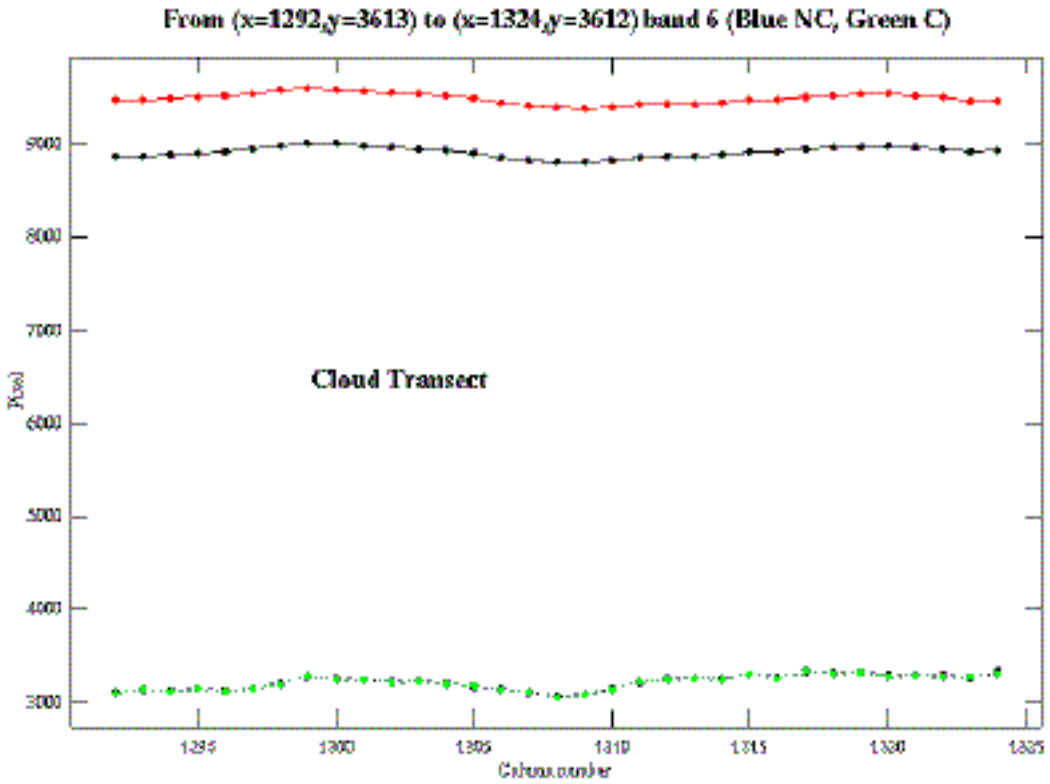

Figure 4b: Same as figure 4a but for band 6.

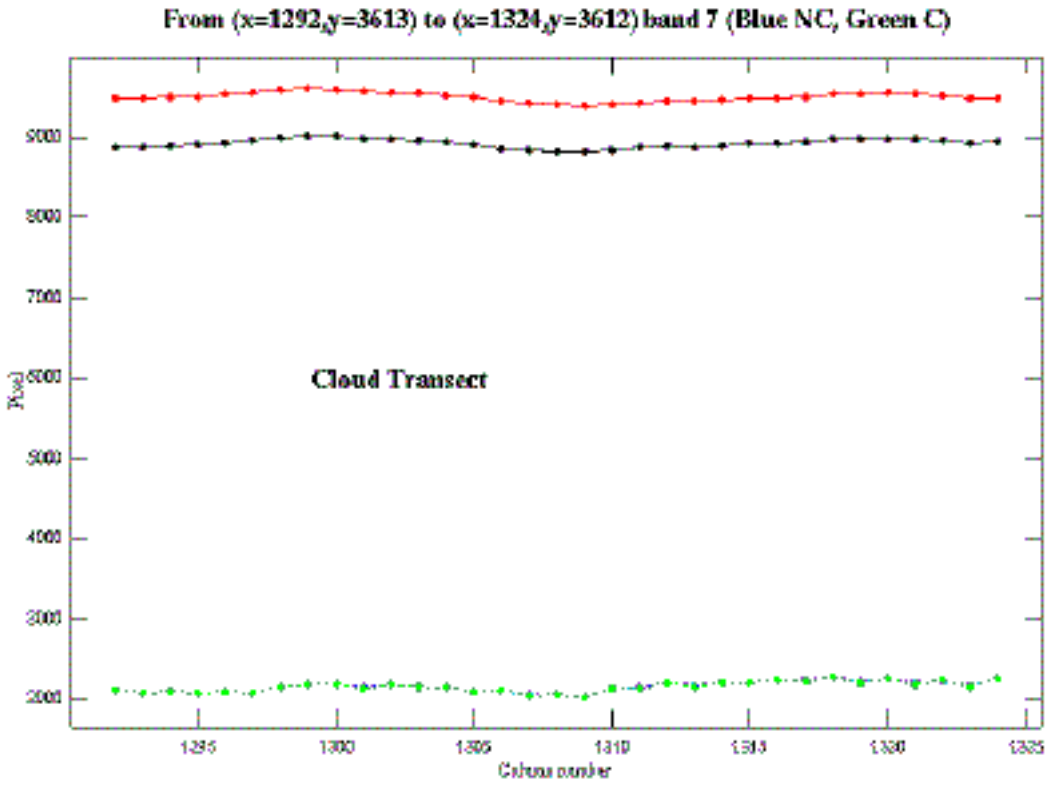

Figure 4c: Same as figure 4a but for band 7.